COMPUTER ARCHITECTURE

COURSE DESCRIPTION

This course is designed to prepare students with work-related skills and for certification in the computer service technician career path. Content provides students the opportunity to acquire knowledge and skill in both theory and practical applications pertaining to troubleshooting, replacing, installing, and upgrading computers. Procedures used in the course may be hardware oriented, software oriented, or programming oriented procedures. Upon completion of the course students will possess a thorough knowledge of modern personal computer hardware and software structure and be able to challenge the A + Certification exam.

Prerequisite: Information Technology Infrastructure
Algebra I or Math for Technology II (may be concurrent)

Recommended Credits: 1

Recommended Grade Level: 10^{th} or 11^{th}

COMPUTER ARCHITECTURE STANDARDS

1. Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.

2. Students will perform the necessary steps to identify, install, configure, and upgrade personal computer modules and peripherals.

3. Students will perform diagnostic operations of hardware and software.

4. Students will demonstrate knowledge of safety and preventive maintenance skills.

5. Students will analyze specific terminology, facts, ways and means of dealing with classifications, categories, and principles of motherboards, processors, and memory in microcomputer systems.

6. Students will research printer types, concepts, and components.

7. Students will analyze network concepts and terminology.

8. Students will analyze underlying DOS (Command prompt functions) in Windows 9x, Windows 2000, and future operating systems in terms of its functions and structure.

9. Students will install, configure and upgrade Windows 9x, and Windows 2000, and future software systems.

10. Students will diagnose and troubleshoot common problems relating to Windows 9x, Windows 2000, and future software systems.

11. Students will evaluate basic concepts relating to Internet access and generic procedures for system setup.

COMPUTER ARCHITECTURE

STANDARD 1.0

Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.

LEARNING EXPECTATIONS

The student will:
1.1 Exhibit positive leadership skills.
1.2 Participate in SkillsUSA-VICA as an integral part of classroom instruction.
1.3 Assess situations and apply problem-solving and decision-making skills to particular client relations in the community and workplace.
1.4 Demonstrate the ability to work cooperatively with others in a professional setting.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:
1.1 Demonstrates character, leadership, and integrity using creative and critical-thinking skills.
1.2.A Applies the points of the creed to personal and professional situations.
1.2.B Participates and conducts meetings and other business according to accepted rules of parliamentary procedure.
1.3.A Analyzes situations in the workplace and uses problem-solving techniques to solve the problem.
1.4.A Participates in a community service project.
1.4.B Assists with an officer campaign with Tennessee SkillsUSA-VICA.

SAMPLE PERFORMANCE TASKS

- Create a leadership inventory and use it to conduct a personal assessment.
- Participate in various SkillsUSA-VICA programs and/or competitive events.
- Evaluate an activity within the school, community, and/or workplace and predict effects of the project.
- Implement an annual program of work.
- Prepare a meeting agenda for a SkillsUSA-VICA monthly meeting.
- Attend a professional organization meeting.
- Participate in the American Spirit Award competition with SkillsUSA-VICA.

INTEGRATION LINKAGES

SkillsUSA-VICA, *Professional Development Program,* SkillsUSA-VICA, Communications and Writing Skills, Teambuilding Skills, Research, Language Arts, Sociology, Psychology, Math, Math for Technology, Applied Communications, Social Studies, Problem Solving, Interpersonal Skills, Employability Skills, Critical-Thinking Skills, Secretary's Commission on Achieving Necessary Skills (SCANS), Chamber of Commerce, Colleges, Universities, Technology Centers, and Employment Agencies

COMPUTER ARCHITECTURE

STANDARD 2.0

Students will perform the necessary steps to identify, install, configure, and upgrade personal computer modules and peripherals.

LEARNING EXPECTATIONS

The student will:

2.1 Comprehend terms, concepts, and functions of system modules.
2.2 Demonstrate basic procedures for adding and removing field replaceable modules for both desktop and portable systems.
2.3 Identify available IRQ, Direct Memory Access (DMA), and I/O addresses and procedures for device installation and configuration.
2.4 Evaluate common peripheral ports, associated cabling, and connectors.
2.5 Analyze proper procedures for installing and configuring IDE/EIDE devices.
2.6 Evaluate proper procedures for installing and configuring small computer system interface (SCSI) devices.
2.7 Evaluate procedures for installing and configuring peripheral devices.
2.8 Explore hardware methods of upgrading system performance, procedures for replacing basic subsystem components, unique components and when to use them.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

2.1 Discusses concepts and functions of system modules using correct technical terminology.
2.2.A Performs procedures for adding modules to computers.
2.2.B Performs procedures for removing field replacements modules from computers.
2.3.A Follows rules for IRQ setup and use in a system.
2.3.B Creates and runs background applications.
2.3.C Activates DMA channels.
2.3.D Defines the I/O address and interrupts for multiple occurrences of devices in use today.
2.4.A Demonstrates and reads a voltmeter to perform tests of power supply.
2.4.B Inspects cabling and connectors.
2.5 Installs and configures IDE/EIDE devices.
2.6 Comprehends SCSI chains, IDs, and terminations.
2.7 Installs and configures peripheral devices.
2.8.A Demonstrates methods of upgrading system performance.
2.8.B Demonstrates when and how to use unique components in system performance.

SAMPLE PERFORMANCE TASKS

- Establish procedures for system assembly and disassembly of field replaceable modules.
- Evaluate modules during normal operation and during the boot process.
- Access memory without using CPU.

- Explain bus-mastering devices.
- Conduct power supply tests.
- Perform basic SCSI repair techniques.
- Research cost of upgrading system performance.
- Install and demonstrate unique components.

INTEGRATION LINKAGES

SkillsUSA-VICA, Occupational Safety and Health Administration (OSHA), Tennessee Occupational Safety and Health Administration (TOSHA), Environmental Protection Agency (EPA), Secretary's Commission on Achieving Necessary Skills (SCANS), *Professional Development Program,* SkillsUSA-VICA, CompTIA, Cisco Networking Technologies, Computer Skills, Science, Electronics, Networking Skills, Math, Language Arts, Teambuilding Skills, Communication Skills, Critical Thinking Skills, Internet Navigation Skills

COMPUTER ARCHITECTURE

STANDARD 3.0

Students will perform diagnostic operations of hardware and software.

LEARNING EXPECTATIONS

The student will:
3.1 Research common symptoms and problems associated with each module.
3.2 Evaluate troubleshooting procedures.
3.3 Elicit problem symptoms from customers.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:
3.1.A Comprehends symptoms relating to common problems.
3.1.B Troubleshoots and isolates problems associated with various modules.
3.2.A Performs needed repairs indicated by inspection and testing.
3.2.B Implements strategic diagnostic procedure by verifying the complaint, defining the problem, isolating the problem, validating the problem, making repairs, and testing the repairs.
3.3.A Communicates with clients to determine symptoms and verifies problems.
3.3.B Performs needed service or repair indicated by client consultation, inspection, and testing.

SAMPLE PERFORMANCE TASKS

- Diagnose a customer complaint.
- Using case scenarios, follow strategy-based diagnostic procedure to verify the complaint, define the problem, isolate the problem, validate the problem, make the repair, and test the repair. Complete a repair order using technical writing skills and calculate salary earnings based on the repair order description and manufacture allowances for each item on the work order. Calculate manufacturer labor operation time used in the diagnostic process.

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COMPUTER ARCHITECTURE

STANDARD 4.0

Students will demonstrate knowledge of safety and preventive maintenance skills.

LEARNING EXPECTATIONS

The student will:

4.1 Research the purpose of various types of preventive maintenance products and procedures.
4.2 Research issues, procedures and devices for protection within the computing environment, including people, hardware and the surrounding workspace.
4.3 Evaluate potential hazards to personnel and equipment when working with lasers, high voltage equipment, ESD, and items that require special disposal procedures.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

4.1 Demonstrates preventive maintenance procedures and precautions when working on microcomputer systems.
4.2 Implements a safe working environment.
4.3.A Avoids electrostatic discharge.
4.3.A Researches environmental guidelines for disposal procedures for items.

SAMPLE PERFORMANCE TASKS

- Research and develop a presentation showing the effects of electrostatic discharge. Present information on how to prevent damage to individuals, equipment and environment by electrostatic discharge and present to school and community audiences.
- Develop a check list for evaluation of a safe working environment.
- Develop a check list on proper disposal of equipment and items.

INTEGRATION LINKAGES

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COMPUTER ARCHITECTURE

STANDARD 5.0

Students will analyze specific terminology, facts, ways and means of dealing with classifications, categories, and principles of motherboards, processors, and memory in microcomputer systems.

LEARNING EXPECTATIONS

The student will:

5.1 Distinguish between the popular CPU chips in terms of their basic characteristics.
5.2 Evaluate the categories of RAM (Random Access Memory) terminology, their locations, and physical characteristics.
5.3 Analyze the most popular type of motherboards, their components, and their architecture bus structures and power supplies.
5.4 Evaluate the purpose of CMOS (Complementary Metal-Oxide Semiconductor), what it contains, and how to change basic parameters.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

5.1 Selects CPU chips for specific functions.
5.2 Evaluates different types of RAM packaging.
5.3.A Comprehends the motherboard's form factor.
5.3.B Comprehends procedures necessary to remove and replace a motherboard.
5.4.A Configures and maintains CMOS properly.
5.4.B Evaluates common reasons for losing CMOS data.

SAMPLE PERFORMANCE TASKS

- Install RAM properly.
- Discuss RAM access speed.
- Access and update data on the CMOS chip.
- Using CPU Soft menu, set the voltage and multiplier settings on the motherboard for the CPU.
- Develop a plan of action to prevent losing CMOS data.
- Develop a check list to assist in adding or replacing a motherboard.

INTEGRATION LINKAGES

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COMPUTER ARCHITECTURE

STANDARD 6.0

Students will research printer types, concepts, and components.

LEARNING EXPECTATIONS

The student will:
6.1 Research basic concepts, printer operations, and printer components.
6.2 Analyze care and service techniques for primary printer types.
6.3 Evaluate common problems associated with primary printer types.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:
6.1 Demonstrates an understanding of printer operations and printer components.
6.2 Demonstrates proper maintenance and service techniques for each printer type.
6.3 Displays a proper approach toward troubleshooting printer problems.

SAMPLE PERFORMANCE TASKS

- Diagnose common printer problem.
- Discuss printer operations.
- Identify common printer components.
- Perform preventative maintenance for each primary printer type.

INTEGRATION LINKAGES

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COMPUTER ARCHITECTURE

STANDARD 7.0

Students will analyze network concepts and terminology.

LEARNING EXPECTATIONS

The student will:

7.1 Identify basic networking concepts, including how a network works and the ramifications of repairs on the network.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

7.1A Evaluates basic networking components.
7.1B Demonstrates difference between network topologies.
7.1C Examines different ways to network a PC.

SAMPLE PERFORMANCE TASKS

- Proper installation of a NIC (Network Interface Card).
- Discuss difference between full and half duplex communications.
- Correctly identifying coaxial, twisted-pair, and fiber-optic cabling.

INTEGRATION LINKAGES

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COMPUTER ARCHITECTURE

STANDARD 8.0

Students will analyze underlying DOS (Command prompt functions) in Windows 9x, Windows 2000, and future operating systems in terms of its functions and structure.

LEARNING EXPECTATIONS

The student will:

8.1 Compare the following operating system's functions, structure, and major system files to navigate the operating system and get to needed technical information:
Windows 9x
Windows 2000
Command Prompt Procedures (Command syntax)

8.2 Analyze basic concepts and procedures for creating, viewing and managing files, directories and disks. This includes procedures for changing file attributes and the ramifications of those changes (for example, security issues).

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

8.1.A Navigates file system structure in Windows 9x, Windows 2000, and in Command Prompt Procedures.

8.1.B Compares and contrasts the difference between the NTFS file system and the FAT or DOS file system.

8.2.A Demonstrates the ability to create, copy, paste, move, and manage files and directories.

8.2.B Demonstrates the ability to change file attributes.

8.2.C Discusses the benefits and disadvantages of each file attribute.

8.2.D Demonstrates the ability to perform security operating systems.

SAMPLE PERFORMANCE TASKS

- Use Windows Explorer to navigate the Windows files system.
- Use the Command Prompt to navigate the DOS file system.
- Use Windows Explorer to copy, paste, cut, and move files on a disk.
- Use the Command Prompt to copy, paste, cut, and move files on a disk.
- Use Windows Explorer to change file attributes.
- Use the Command Prompt to change file attributes.

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COMPUTER ARCHITECTURE

STANDARD 9.0

Students will install, configure, and upgrade Windows 9x, Windows 2000, Windows NT, and future operating systems.

LEARNING EXPECTATIONS

The student will:

9.1 Demonstrate procedures for installing Windows 9x, and Windows 2000 for bringing the software to a basic operational level.
9.2 Demonstrate steps to perform an operating system upgrade.
9.3 Perform basic system boot sequences and boot methods, including the steps to create an emergency boot disk with utilities installed for Windows 9x, Windows 2000, and Windows NT.
9.4 Demonstrate procedures for loading/adding and configuring application device drivers, and necessary software for certain devices.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

9.1 Demonstrates the ability to successfully install the operating system onto the PC's hard disk.
9.2 Performs an operating system upgrade.
9.3.A Comprehends and discusses each operating system's boot sequences.
9.3.B Creates a bootable emergency restore disk for each version of Windows.
9.4 Locates, installs, and configures the necessary application device drivers for the PC's installed hardware.

SAMPLE PERFORMANCE TASKS

- Partition and format the hard disk; then, install the operating system on the PC's hard disk.
- Perform an operating system service pack; install and upgrade the operating system to the next generation operating system.
- Create an emergency boot disk with utilities installed for Windows 9x, Windows NT, and Windows 2000.
- Locate, install, and configure the necessary application device drivers for a system.

INTEGRATION LINKAGES

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COMPUTER ARCHITECTURE

STANDARD 10.0

Students will diagnose and troubleshoot common problems relating to Windows 9x and Windows 2000, and future operating systems.

LEARNING EXPECTATIONS

The student will:

10.1 Recognize and interpret the meaning of common error codes and startup messages from the boot sequence, and identify steps to correct the problems.

10.2 Analyze common problems and determine how to resolve them.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

10.1 .Demonstrates the ability to correctly evaluate common error codes, and perform the necessary steps to identify and correct the problem.

10.2 Demonstrates the ability to troubleshoot common problems related to the PC and determines how resolve the problem.

SAMPLE PERFORMANCE TASKS

- Identify common BIOS error codes.
- Identify common BIOS error messages.
- Identify common system errors.
- Troubleshoot common PC system errors.
- Repair common PC errors.

INTEGRATION LINKAGES

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COMPUTER ARCHITECTURE

STANDARD 11.0

Students will evaluate basic concepts relating to Internet access and generic procedures for system setup.

LEARNING EXPECTATIONS

The student will:
11.1 Identify the networking capabilities of Windows including procedures for connecting to the network.
11.2 Identify concepts and capabilities relating to the Internet and basic procedures for setting up a system for Internet access.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:
11.1 Comprehends installation and configuration of network protocols, clients, and services.
11.2.A Understands Internet terminology, connection types and their related speeds.
11.2.B Successfully configures a dial-up connection.

SAMPLE PERFORMANCE TASKS

- Install and configure network protocols, clients, and services.
- Demonstrate configuration of file and printer sharing, as well as other shared network resources.
- Configure dial-up connection.
- Install and configure browsers.

INTEGRATION LINKAGES

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